California's Installed Electric Power Capacity and Generation

The power plant capacities and electric generation in the charts and tables below represent the total operational capacity and resulting electric generation of power plants within both publicly owned and investor-owned utility service territories in California. The capacity and generation amounts do not reflect contracted capacity and generational requirements as measured under California's Renewables Portfolio Standard (RPS). Moreover, the RPS is based on retail sales that are a subset of the total electricity generated each year and presented in these charts and tables. The information presented here should not be used to determine progress toward the RPS as detailed below. Please refer to the Tracking Progress page on Renewable Energy for more information about the state's RPS. The data presented here are termed *total system power* and provide information on California's total fuel mix over several years. The total system power is useful for comparing California's use of various fuels, including natural gas, nuclear energy, large hydropower, and renewables—or for making comparisons over several years.

Why Data Reported Here is Not a Proxy for RPS Compliance

The information presented here is fundamentally different from what is reported for RPS compliance. To begin, the total system power reported here refers to the annual accounting of electricity generated within California and electricity imported into the state from Canada, Mexico, and other regions in the US. For power plants located within California, the energy is measured at the generating unit as reported by the power plant owner. Electricity from out-of-state energy is measured as it enters California and is received by a California balancing authority. For most power plants, the reported energy does not account for losses through the transmission and distribution systems. Further, *unaccounted for* energy losses (for example, from short circuits, line failures, and transformer losses) prior to reaching the residential, commercial, or industrial end-user are not accounted for here. In total, line losses can exceed 8 percent.

The RPS includes eligibility and accounting requirements that are different from the accounting used to estimate total system power, with highlights described below.

- The Energy Commission certifies if a renewable facility is eligible for the RPS. Some renewable facilities included in the total system power are not eligible for the RPS.
- The RPS is calculated as a percentage of retail sales. Retail sales are typically based on electricity delivered to residential, commercial, industrial, and agricultural customers. The statute excludes the following electricity consumption from the calculation of retail sales: electricity delivered to federal Department of Energy facilities, military bases, water pumping facilities such as the Central Valley Project and the State Water Project, utility use, electric vehicle charging, and street lighting.
- For the RPS, electricity retail sellers (investor-owned utilities, publicly owned utilities, energy service providers, and community-choice aggregators) use renewable energy credits (RECs) to meet their obligation for multi-year compliance periods. A REC

represents 1 megawatt-hour of electricity generation from renewable sources. Renewable generation facilities may be located anywhere within the Western Electricity Coordinating Council (WECC) region and sell energy and/or RECs to a California retail seller of electricity to meet its RPS obligation, provided the facility meets all RPS-eligibility criteria established by the Energy Commission. Compliance with California's RPS program is determined by the amount of RECs retired for compliance within three multi-year compliance periods though 2020.

- California's RPS program defines all renewable procurement from contracts executed after June 1, 2010, into three portfolio content categories, commonly referred to as "buckets." The determination of whether RECs fall into Category 1, 2, or 3 for the purposes of RPS-compliance will be made at the end of each compliance period. Category 1 procurement is for both the energy and associated RECs from a RPS-compliant facility. Category 2 procurement is for renewable energy and associated RECs that cannot be directly delivered to a buyer but is instead delivered by substitute energy (firmed and shaped). Category 3 is for the purchase of RECs without the corresponding energy or RECs that do not comply with Category 1 and Category 2 RECs, referred to as unbundled RECs. While Category 1 and Category 2 RECs include the associated energy delivered within the same calendar year, there can be up to a 3-year lag for Category 3 unbundled RECs to be retired. Accordingly, in calculating the state's progress towards the 33 percent and 50 percent renewable mandates, the differences between total system power, retail sales, and the inclusion of unbundled RECs makes the comparison impossible.

In summary, there are fundamental differences between the annual accounting of electric generation in this total system power analysis and the RPS accounting requirements. Due to the complexity of accounting for energy losses from transmission and distribution, RPS-eligibility requirements for power plants, and end-use consumption that is not subject to RPS, the annual total system power summary should not be used as a proxy for determining the state's progress toward its RPS goals.

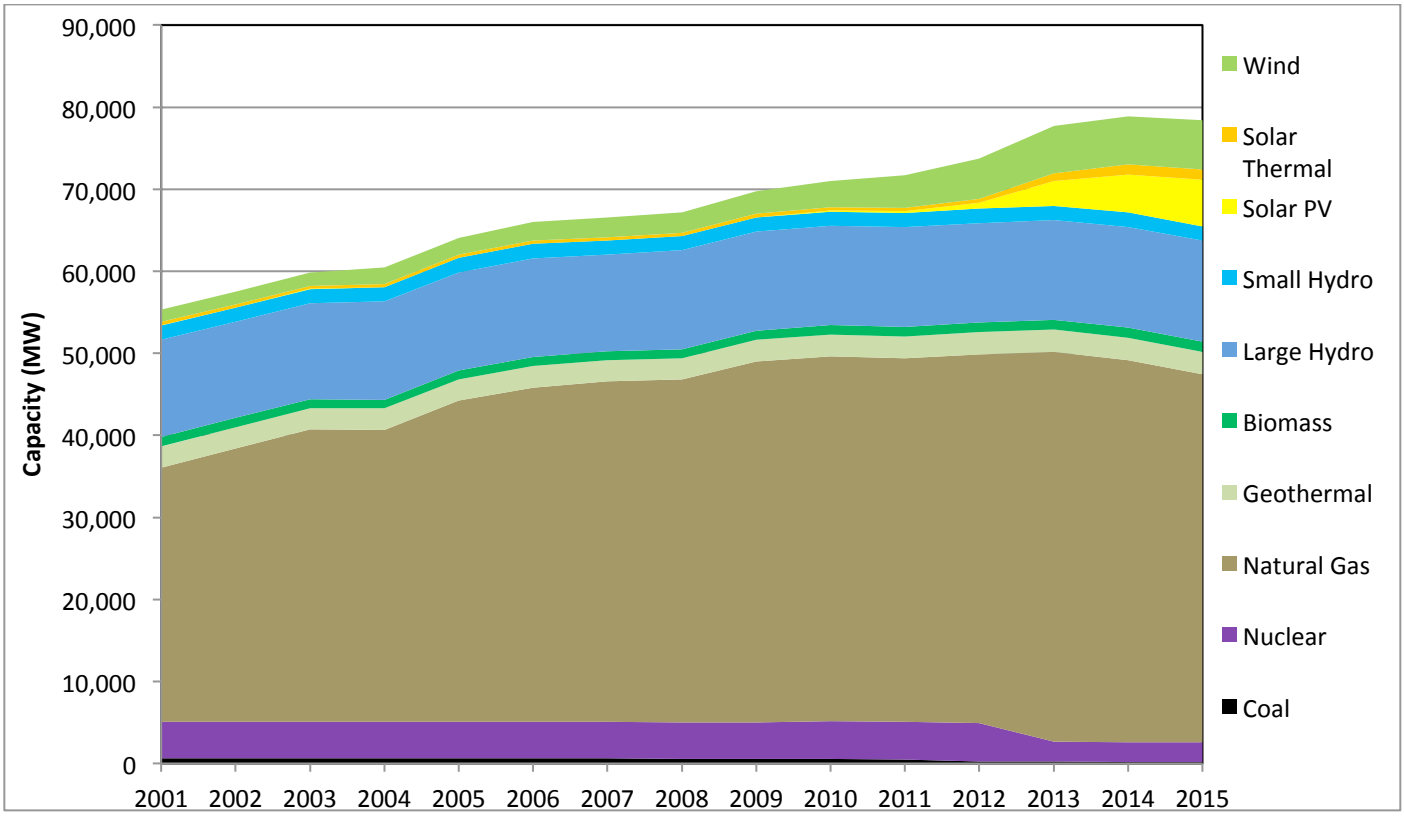
Installed Capacity

Figure 1 shows on-line capacity by technology for California from 2001 to 2015. The data are collected under the authority of the California Code of Regulations, Title 20, Division 2, Chapter 3, Section 1304(a) (1)-(2).[1] Data are as of June 29, 2016. Power plants fueled by natural gas provide the largest portion of the in-state installed capacity.

The values reported in **Figure 1** on the next page reflect nameplate capacity, which is the maximum possible output from a generation facility as designated by the manufacturer.

1 In 2015, about 440 companies reported to the Energy Commission on more than 1,300 power plants in California.

Figure 1: Installed In-State Electric Generation Capacity by Fuel Type (Nameplate Capacity)



Source: California Energy Commission, CEC-1304 Power Plant Data Reporting.

Table 1 provides the data used in **Figure 1**. These data show the nameplate capacity of all power plants 1 megawatt (MW) and larger within California operating as of December 31 of each year. Behind-the-meter or customer-side capacity and generation from facilities smaller than 1 MW are not accounted for in the figures and charts below. Examples include distributed electric generation such as rooftop solar photovoltaic (PV) installations on residential homes and backup generators used for emergency purposes in larger applications such as hospitals and commercial locations. Facilities smaller than 1 MW are not required to be reported to the Energy Commission under the CEC-1304 regulations.

Table 1: Installed In-State Electric Generation Capacity by Fuel Type

Nameplate Capacity (MW)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Coal	602	602	602	602	602	602	602	578	584	589	451	283	283	175	175
Biomass	1,144	1,140	1,084	1,075	1,080	1,085	1,093	1,082	1,095	1,104	1,148	1,177	1,208	1,292	1,294
Geothermal	2,625	2,623	2,623	2,623	2,623	2,641	2,586	2,598	2,648	2,648	2,648	2,703	2,703	2,703	2,716
Nuclear	4,456	4,456	4,456	4,456	4,456	4,456	4,456	4,456	4,456	4,577	4,647	4,647	2,393	2,393	2,393
Natural Gas	30,974	33,307	35,638	35,603	39,163	40,753	41,492	41,764	43,961	44,497	44,309	44,925	47,488	46,584	44,880
Large Hydro	11,848	11,713	11,713	11,962	11,951	12,042	11,793	12,074	12,074	12,105	12,145	12,145	12,155	12,244	12,252
Small Hydro	1,751	1,744	1,740	1,739	1,743	1,745	1,747	1,749	1,756	1,745	1,744	1,756	1,750	1,749	1,741
Solar PV	2	2	2	2	2	2	2	6	13	111	216	739	3,032	4,602	5,697
Solar Thermal	410	378	378	378	378	400	400	400	408	408	408	408	925	1,300	1,249
Wind	1,534	1,544	1,571	2,064	2,089	2,310	2,373	2,462	2,728	3,183	3,992	4,967	5,785	5,869	5,998
Grand Total	55,347	57,510	59,808	60,504	64,087	66,037	66,546	67,169	69,722	70,966	71,710	73,751	77,723	78,910	78,395

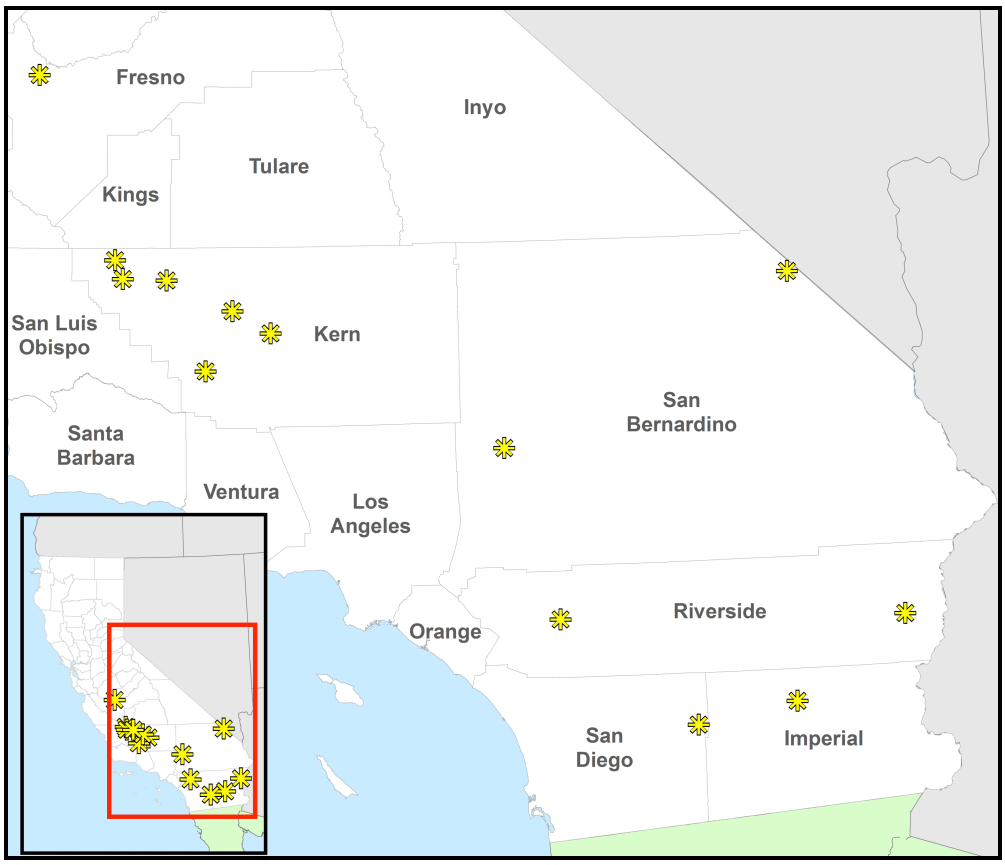
Source: California Energy Commission, CEC-1304 Power Plant Data Reporting.

While most of the fuel-type categories had little change over the past year, utility-scale solar PV capacity increased by 1,095 MW to 5,697 MW in 2015. This increase included both capacity expansions to existing solar PV plants, as well as new facilities that went on-line in 2015. Capacity expansions included Solar Star I (144 MW added) and Solar Star II (45 MW added), both in Kern County. Significant new solar PV projects in California by county included:

- Desert Stateline Solar Facility (186 MW) and Alamo Solar (20 MW) in San Bernardino County; McCoy Solar (126 MW) and AP North Lake Solar (20 MW) in Riverside County.;
- North Star Solar (62 MW) in Fresno County; Seville Solar One (20 MW) and Seville Solar Two (30 MW) in San Diego County, and IVSC 2 (20 MW) in Imperial County.
- Hayworth Solar Farm (27 MW), Lost Hills Solar (21 MW), Wildwood Solar I (20 MW), Shafter Solar (20 MW), Maricopa West Solar (20 MW), and Coronal Lost Hills Solar (20 MW) in Kern County.

Figure 2 provides an overview of the counties and locations of California's newest solar PV projects.

Figure 2: Significant Solar PV Project Online in 2015

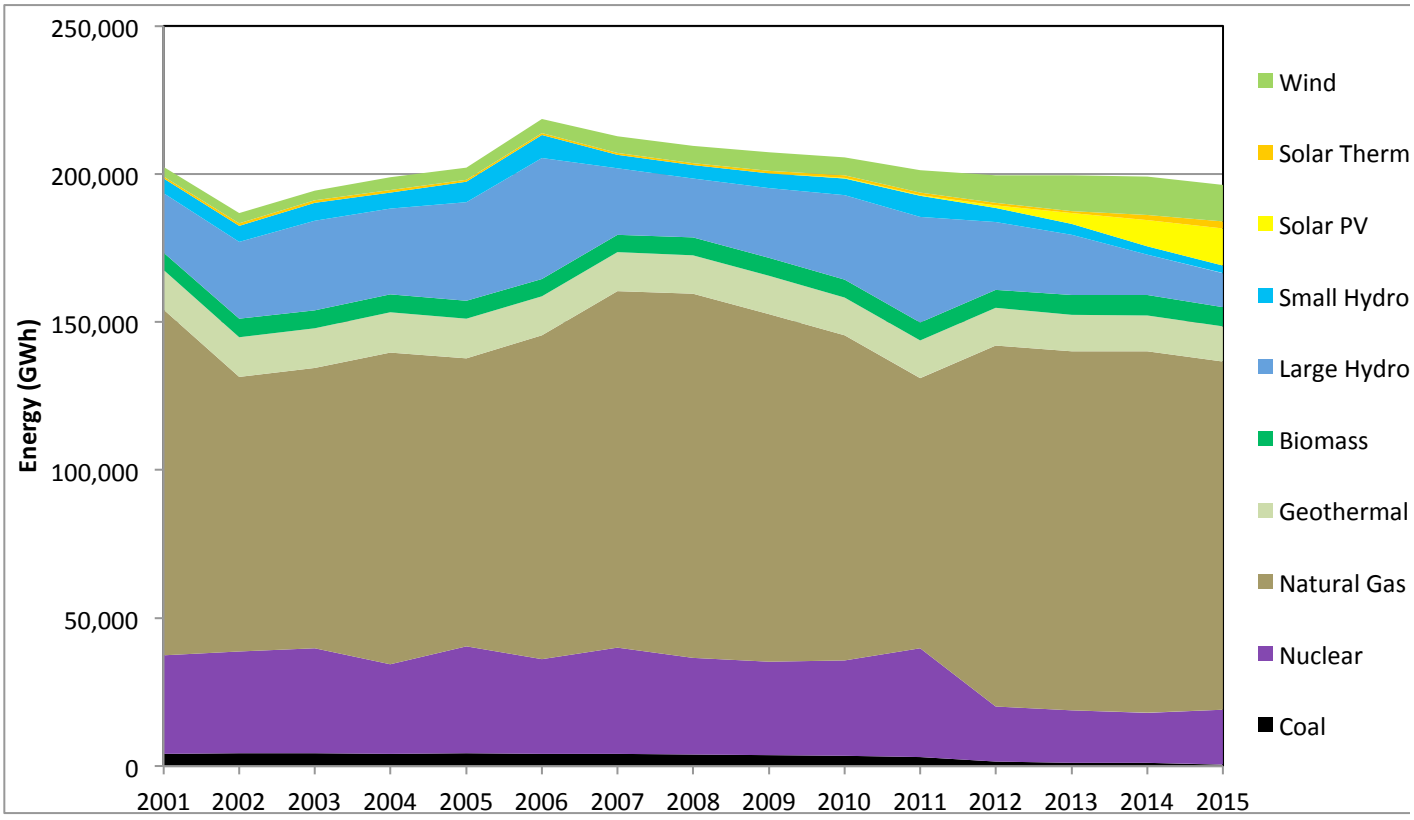


Source: Energy Commission Cartography Office.

Electric Generation

Figure 3 shows the total generation from all California power plants rated at 1 MW and larger for 2015.

Figure 3: In-State Electric Generation by Fuel Type From Power Plants Larger Than 1 MW



Source: CEC-1304 Power Plant Data Reporting.

Table 2 shows the 15 years of data used in **Figure 3**. In 2015, in-state power generation was 196,193 gigawatt-hours (GWh), down 1.5 percent from 2014. Renewable generation from wind and solar technologies continued to grow in 2015, offsetting reduced hydroelectric generation from the ongoing drought in California. Solar thermal and solar PV electric generation grew 42 percent to 15,043 GWh in 2015 from 10,585 GWh in 2014. Total in-state wind generation leveled off at 12,180 GWh for 2015. Overall, renewables in California accounted for 24.5 percent of the total in-state electric generation in 2015, an increase of 1.7 percent from 2014.

Table 2: In-State Electric Generation by Fuel Type From Power Plants Larger Than 1 MW

Energy (GWh)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Coal	4,042	4,275	4,272	4,093	4,283	4,190	4,219	3,983	3,738	3,410	3,120	1,581	1,018	1,011	538
Biomass	5,762	6,197	6,094	6,082	6,078	5,863	5,764	5,927	6,111	5,981	6,044	6,199	6,543	6,768	6,362
Geothermal	13,525	13,396	13,329	13,494	13,292	13,093	13,084	12,907	12,907	12,740	12,685	12,733	12,479	12,186	11,994
Nuclear	33,294	34,353	35,594	30,241	36,155	32,036	35,698	32,482	31,509	32,214	36,666	18,491	17,860	17,027	18,525
Natural Gas	116,756	92,819	94,637	105,390	97,345	109,344	120,582	123,162	117,371	109,946	91,277	121,942	121,127	122,066	117,558
Large Hydro	20,144	26,003	30,325	28,945	33,334	40,952	22,640	19,887	23,659	28,483	35,682	22,737	20,319	13,739	11,569
Small Hydro	4,844	5,354	5,996	5,545	6,928	7,607	4,466	4,573	4,880	5,706	7,049	4,723	3,778	2,737	2,423
Solar PV	3	2	2	2	2	2	2	3	13	84	211	964	3,656	8,961	12,600
Solar Thermal	834	848	757	739	658	614	666	730	841	879	889	867	686	1,624	2,446
Wind	3,242	3,546	3,316	4,258	4,084	4,902	5,570	5,724	6,249	6,172	7,598	9,242	11,964	13,074	12,180
Grand Total	202,445	186,794	194,320	198,788	202,160	218,601	212,691	209,378	207,278	205,614	201,223	199,478	199,430	199,193	196,195

Source: CEC-1304 Power Plant Data Reporting

Additional References:

For more information on the Renewables Portfolio Standard, please visit the following pages: http://www.energy.ca.gov/portfolio/index.html.

http://www.cpuc.ca.gov/NR/rdonlyres/2060A18B-CB42-4B4B-A426-E3BDC01BDCA2/0/2012_Q1Q2_RPSReport.pdf.

For a complete profile of California's total generation, please visit the following two sources within the Energy Almanac:

Total System Power
http://energyalmanac.ca.gov/electricity/total_system_power.html.

Electric Generation by Resource Type
http://energyalmanac.ca.gov/electricity/electricity_generation.html.

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